What is claimed is:

1. A plasma-electric power generation system comprising

a chamber having a principle axis,

a first magnetic field generator for creating an azimuthally symmetric magnetic field within a central region of the chamber with a flux substantially parallel to the principle axis of the chamber,

a current coil concentric with the principle axis of the chamber for creating an azimuthal electric field within the chamber,

a first set of hemi-cylindrical electrodes forming a first tapered cylindrical surface in a first end region of the chamber, wherein the first set of electrodes comprises two electrodes in spaced relation forming a gap between adjacent sides of the electrodes,

a second magnetic field generator for creating an azimuthally symmetric magnetic field within the first end region of the chamber with a flux substantially parallel to the principle axis of the chamber,

an electron collector interposing the first and second magnetic field generators and adjacent a first end of the first set of electrodes, and

an ion collector positioned adjacent a second end of the first set of electrodes.

2. The system of claim 1 further comprising

a second set of hemi-cylindrical electrodes forming a second tapered cylindrical surface in a second end region of the chamber, wherein the second set of electrodes

comprises two electrodes in spaced relation forming a gap between adjacent sides of the electrodes,

a third magnetic field generator for creating an azimuthally symmetric magnetic field within the second end region of the chamber with a flux substantially parallel to the principle axis of the chamber,

a second electron collector interposing the first and third magnetic field generators and adjacent a first end of the second second set of electrodes, and

a second ion collector positioned adjacent a second end of the second set of electrodes.

3. The system of claim 1 further comprising a resonant circuit coupled to the first set of electrodes.

4. The system of claim 1 further comprising a tank circuit coupled to the first set of electrodes.

5. The system of claim 1 wherein the electron collector is annularly shaped.

6. The system of claim 1 wherein the first and second magnetic field generators comprise annular field coils disposed about the chamber, wherein the field lines of the magnetic field generated by the field coils of the first magnetic field generator run in a

direction opposite to the field lines of the magnetic field generated by the field coils of the second magnetic field generator.

7. The system of claim 1 wherein the electron collector and ion collector are electrically coupled.

8. The system of claim 1 wherein the first set of electrodes are symmetrical.

9. The system of claim 6 wherein the first magnetic field generator further comprises first and second sets of mirror coils disposed in spaced relation about the chamber.

10. The system of claim 1 further comprising plasma injectors coupled to the chamber.

11. The system of claim 10 wherein the plasma injectors are axially oriented to inject plasma toward a mid-plane of the chamber.

12. The system of claim 1 wherein the first magnetic field generator is tunable.

13. The system of claim 12 further comprising a control system coupled to the first magnetic field generator.

14. The system of claim 1 wherein the current coil is a betatron flux coil.

15. The system of claim 1 wherein the current coil includes parallel windings of a plurality of separate coils.

16. The system of claim 1 further comprising ion beam injectors coupled to the vessel.

17. The system of claim 16 wherein the ion beam injectors include a means for neutralizing the electric charge of the ion beams emitted from the injectors.

18. A plasma-electric power generation system comprising

a fusion reactor having a first magnetic field generator, and

an inverse cyclotron energy converter coupled to a first end of the fusion reactor, the converter comprising

first and second partially cylindrical electrodes forming a cylindrical surface and in spaced relation to form a gap between adjacent electrodes, and adopted to form a dipole electric field,

a second magnetic field generator,

an electron collector interposing the first and second magnetic field generators and adjacent a first end of the first and second electrodes, and

an ion collector positioned adjacent a second end of the first and second electrodes.

19. The system of claim 18 further comprising a second inverse cyclotron energy converter coupled to a second end of the fusion reactor.

20. The system of claim 18 further comprising a cylindrical vessel.

21. The system of claim 18 further comprising a resonant circuit coupled to the first and second electrodes.

22. The system of claim 18 further comprising a tank circuit coupled to the first and second electrodes.

23. The system of claim 18 wherein the electron collector is annularly shaped.

24. The system of claim 20 wherein the first and second magnetic field generators comprise annular field coils disposed about the vessel, wherein the field lines of the magnetic field generated by the field coils of the first magnetic field generator run in a direction opposite to the field lines of the magnetic field generated by the field coils of the second magnetic field generator.

25. The system of claim 18 wherein the electron collector and ion collector are electrically coupled.

26. The system of claim 18 wherein the first and second electrodes are symmetrical.

27. The system of claim 18 wherein the first and second electrodes are tapered.

28. The system of claim 18 wherein the first and second electrodes are hemi-cylindrical.

29. The system of claim 24 wherein the first magnetic field generator further comprises first and second sets of mirror coils disposed in spaced relation about the vessel and defining a power core region therebetween.

30. The system of claim 20 wherein the fusion reactor further comprises a current coil concentric with a principle axis of the vessel and positioned within the power core region.

31. The system of claim 30 wherein the fusion reactor further comprises plasma injectors coupled to the vessel.

32. The system of claim 31 wherein the plasma injectors are axially oriented to inject plasma toward a mid-plane of the power core region.

33. The system of claim 18 where in the first magnetic field generator is tunable.

34. The system of claim 33 further comprising a control system coupled to the first magnetic field generator.

35. The system of claim 30 wherein the current coil is a betatron flux coil.

36. The system of claim 30 wherein the current coil includes parallel windings of a plurality of separate coils.

37. The system of claim 20 wherein the fusion reactor further comprises ion beam injectors coupled to the vessel.

38. The system of claim 37 wherein the ion beam injectors include a means for neutralizing the electric charge of the ion beams emitted from the injectors.

39. A plasma-electric power generation system comprising

a chamber,

a means for creating a magnetic field within a central region of the vessel having a field reversed configuration (FRC),

a means for injecting plasma into the vessel,

a means for forming a dipole electric field having two poles disposed within a first end region of the vessel, and

a means for forming a magnetic cusp coupled to the vessel.

40. The power generation system of claim 39 wherein the means for forming the dipole electric field comprises two electrodes.

41. The power generation system of claim 40 wherein the two electrodes are symmetrical.

42. The power generation system of claim 40 wherein the two electrodes are hemi-cylindrical.

43. The power generation system of claim 40 wherein the two electrodes are in spaced relation with one another forming a gap between adjacent sides of the electrodes.

44. The power generation system of claim 40 where the means for forming the dipole electric field further comprises a resonant circuit coupled to the two electrodes.

45. The power generation system of claim 39 wherein the means for forming a magnetic cusp comprises first and second sets of field coils disposed about the chamber.

46. The power generation system of claim 45 wherein the first and second magnetic fields generated by the first and second sets of field coils have oppositely running field lines.

47. The power generation system of claim 46 further comprising an electron collector disposed about the chamber in a magnetic cusp region adjacent a first end of the means for forming the dipole electric field..

48. The power generation system of claim 47 wherein the electron collector is annularly shaped.

49. The power generation system of claim 47 further comprising a ion collector disposed adjacent a second end of the means for forming the dipole electric field.

50. The power generation system of claim 49 wherein the ion collector is disposed within the chamber.

51. The power generation system of claim 40 further comprising a tank circuit coupled to the means for forming the dipole electric field.

52. The power generation system of claim 49 wherein the electron collector and ion collector are electrically coupled.

53. The power generation system of claim 39 wherein the means for generating an FRC includes a plurality of field coils coupled to the chamber.

54. The power generation system of claim 53 wherein the means for generating an FRC further comprises a plurality of mirror coils coupled to the chamber.

55. The power generation system of claim 54 wherein the means for generating an FRC further comprises a current coil positioned along a principle axis of the chamber for creating an azimuthal electric field within the chamber.

56. The power generation system of claim 55 wherein the current coil is a betatron flux coil.

57. The power generation system of claim 56 wherein the betatron flux coil comprises a plurality of separate coils parallely wound.

58. The power generation system of claim 39 wherein the means for injecting plasma includes a plurality of background plasma guns oriented to inject a background plasma

substantially parallel to a principle axis of the chamber toward a mid-plane of the chamber.

59. The power generation system of claim 58 further comprising ion beam injectors to inject ion beams into the chamber.

60. The power generation system of claim 59 wherein the ion beam injectors include a neutralizing means to inject electric charge neutralized ion beams into the chamber.

61. The power generation system of claim 39 wherein the chamber is generally cylindrical.